This following listing of claims replaces all previous versions of the claims:

Claims

What is claimed:

1. (currently amended) An apparatus for maximum work comprising:

a) refrigeration machine comprising a condenser for generating hot supply water and an evaporator for generating cold supply water;

b) a water blending circuit;

c) a hot supply/return piping loop connected to the condenser and the water blending circuit, a cold supply pipe ~~piping loop~~ connected to an evaporator primary loop and the water blending circuit, and a cold return pipe ~~piping loop~~ connected to the water blending circuit and the evaporator primary loop;

d) the water blending circuit comprising a hot supply runout pipe connected to the hot supply/return piping loop and a cold supply runout pipe connected to the cold supply pipe ~~piping loop~~;

e) an upstream two position three way changeover valve connected to the hot supply runout pipe and the cold supply runout pipe, the upstream two position three way changeover valve for allowing hot water or cold water to flow through there-through;

f) a modulating three way zone blending valve located downstream from and connected to the upstream two position three way valve;

g) a blending pump connected to the modulating three way zone blending valve at a downstream location,

h) a roomside coil connected to the blending pump, the blending pump for pumping water through the roomside coil;

i) a coil return pipe extending from the coil through which coil return water exits the coil, the coil return pipe connected to the modulating three way zone blending valve and connected to a downstream two position three way changeover valve, the modulating three way zone blending valve for allowing all, a portion of, or none of the coil return water to be returned by the blending pump and pumped through the roomside coil;

j) the downstream two position three way changeover valve connected to a cold return runout pipe and connected to a hot return runout pipe;

k) the cold return runout pipe connected to the cold return pipe ~~loop~~ that connects to the evaporator primary loop and is for returning cold water to the evaporator primary loop, and the hot return runout pipe is connected to the hot supply/return piping loop connected to the condenser and is for returning hot water to the condenser; and

l) a means for control for controlling the refrigeration machine.

2. (original) The apparatus for maximum work according to claim 1 further comprising:

a) an airside equipment room for generating and directing supply air and comprising an airside equipment coil; and

b) ducts for directing the supply air to a zone or an area

being conditioned and a zone thermostat for sensing an air temperature of the zone, and a return water thermostat for sensing a temperature of the coil return water, the return water thermostat for controlling the modulating three way zone blending valve to regulate the amount of coil return water repumped through the roomside coil.

3. (original) The apparatus according to claim 2 wherein the modulating three way zone blending valve opens or closes in response to electronic instructions provided by the zone thermostat and return water thermostat to open or close to allow all, none, or a percentage of return coil water to be returned by the blending pump and recirculated through the roomside coil.

4. (original) The apparatus for maximum work according to claim 1 further comprising airside equipment for generating and delivering supply air to a zone or room, and a duct through which the supply air flows.

5. (original) The apparatus for maximum work according to claim 1 wherein the water blending circuit further comprises one of the following:

a) a fan coil unit;
b) a radiant ceiling; and
c) an induction unit.

6. (original) The apparatus for maximum work according to claim 3 wherein for maximum cooling of the zone the zone thermostat and return water thermostat instruct the upstream two

position three way valve to open to the flow of cold water and the modulating three way zone blending valve to open to the flow of cold water and close to the flow of coil return water and instructs the downstream three way two position changeover valve to direct all the coil return water to the cold return pipe.

7. (original) The apparatus for maximum work according to claim 3 wherein for maximum heating of the zone the zone thermostat and return water thermostat instruct the upstream two position three way valve to open to the flow of hot water and instructs the modulating three way zone blending valve open to the flow of hot water and close to the flow of coil return water and instructs the downstream three way two position changeover valve to direct the coil return water to the hot supply/return pipe.

8. (original) The apparatus for maximum work according to claim 1 further comprising a means for control for automatically controlling the refrigeration machine and water blending circuit.

9. (original) The apparatus for maximum work according to claim 1 wherein the cold supply water is delivered to the water blending circuit at about 52° Fahrenheit year round.

10. (original) The apparatus for maximum work according to claim 9 further comprising a roomside cold water loop comprising a modulating three way mixing valve for the roomside cold water loop, one port of the modulating three way mixing valve for the

roomside cold water loop connected to the cold water return and the other port of the modulating three way mixing valve for the roomside cold water pipe connected to the cold supply piping loop, a cold variable frequency drive cold water pump and a cold water supply to roomside equipment pressure controller for controlling the variable frequency drive cold water pump at a constant pressure, and a thermostat for modulating three way mixing valve for the cold water loop so that cold supply water at about 52° Fahrenheit is delivered to the water blending circuit year round.

11. (original) The apparatus for maximum work according to claim 1 wherein the airside equipment is for the supply air to the roomside equipment and the supply air has about a 48° Fahrenheit dry bulb temperature, about a 48° Fahrenheit wet bulb temperature, and about a 48° Fahrenheit dew point temperature year-round.

12. (currently amended) The apparatus for maximum work according to claim 2 further comprising a campus of buildings wherein the refrigeration machine, a boiler, an evaporative cooler, and a hot storage tank and a cold storage tank are located in a central equipment heating/cooling plant building and an airside equipment unit is installed in each building ~~attached to buildings~~ in the campus, and wherein the hot supply/return piping loop, the cold supply pipe ~~piping loop~~, and the cold return pipe ~~piping loop~~ extend to and from the ~~refrigeration machine in~~ the central equipment heating/cooling plant building to the campus buildings.

13. (withdrawn) An apparatus for maximum work comprising:

a) a cold supply piping loop for transporting cold water, a hot supply/return piping loop for transporting hot supply/return water, and a cold return piping loop for returning cold water;

b) roomside equipment comprising a water blending circuit comprising a hot supply runout pipe connected at one end to the hot supply/return piping loop and connected at the other end to a port of an upstream two position three way changeover valve, and a cold supply runout pipe connected at one end to the cold supply piping loop and connected at the other end to a port of the upstream two position three way changeover valve;

c) a modulating three way zone blending valve connected by a pipe to the third port of the upstream two position three way changeover valve at a downstream location;

d) a pipe connected at one end to one port of the modulating three way zone blending valve and connected at the other end to a blending pump for receiving water from the modulating three way zone blending valve and pumping a constant volume of the water through a roomside coil; and

e) a return pipe located at the outlet of the roomside coil for receiving coil return water, a pipe connecting the return pipe to the modulating three way zone blending valve and wherein the modulating zone blending valve allows all, some, or none of the return water to recirculate through the coil.

14. (withdrawn) The apparatus according to claim 13 further wherein the return pipe extends to a downstream two position

three way changeover valve which directs the return water to the hot supply/return piping loop or the cold return piping loop.

15. (withdrawn) The apparatus according to claim 13 further comprising means for control, a roomside thermostat, and a return water thermostat the means for control for receiving air temperature information and return water temperature information and automatically controlling the blending pump and modulating three way valve.

16. (withdrawn) An apparatus for maximum work comprising:

a) airside equipment comprising a fan for blowing the air through a runaround coil section with a runaround coil positioned therein, a reheat/recooling coil section with a reheat/recooling coil positioned therein, a sprayed coil section with a sprayed coil positioned therein, and a supply air discharge section;

b) a refrigeration machine for providing cold water to the reheat/recooling coil and sprayed cooling coil in a summer cycle of operation;

c) the refrigeration machine for providing hot water to the reheat/recooling coil in a winter cycle of operation;

d) the supply air discharge section for sending supply air to roomside equipment through a duct to a zone, the roomside equipment comprising a water blending circuit comprising a roomside equipment coil for heating or cooling the zone; and

e) a fan for blowing return/exhaust air out of the apparatus.

17. (withdrawn) The apparatus for maximum work according to claim 16 wherein the runaround coils are filled with a fluid comprising glycol.

18. (withdrawn) The apparatus for maximum work according to claim 16 wherein in the summer cycle cold water from the refrigeration machine is pumped through a pipe connected to a cold water primary loop to an airside modulating three way mixing valve that allows cold water to first flow through the sprayed cooling coil and then through the reheat/recooling coil and returned to the cold water loop.

19. (withdrawn) The apparatus for maximum work according to claim 18 wherein the cold water is supplied at a temperature of about 40° Fahrenheit and is returned at a temperature of about 52° Fahrenheit.

20. (withdrawn) The apparatus for maximum work according to claim 16 wherein in the winter cycle hot water from the refrigeration machine is pumped through a two position three way diverting valve located at a downstream position from the airside modulating three way mixing valve, the two position three way diverting valve directs all the flow of hot water through the reheat/recooling coil in the winter cycle so that the sprayed cooling coil has no water flow there-through in the winter cycle of operation.

21. (withdrawn) The apparatus for maximum work according to claim 16 wherein in the summer months the supply air generated

by the airside equipment is at about a 48° Fahrenheit dry bulb temperature, about a 48° Fahrenheit wet bulb temperature, and about a 48° Fahrenheit dew point during the summer months and wherein the supply air is sent through ducts to the roomside equipment.

22. (withdrawn) The apparatus for maximum work according to claim 16 wherein in the winter months the supply air generated by the airside equipment has about a 48° Fahrenheit dry bulb temperature, about a 48° Fahrenheit wet bulb temperature, and about a 48° Fahrenheit and dew point temperature during the winter months.

23. (withdrawn) The apparatus for maximum work according to claim 16 further comprising an outside thermostat, a hot water supply thermostat, and a supply air thermostat in communication with means for control, the outside thermostat for providing information to the controller so the refrigeration machine may be instructed to ramp up for the winter or ramp down for the summer.

24. (withdrawn) The apparatus for maximum work according to claim 16 further comprising a water blending circuit for delivering hot and cold water to a roomside zone and wherein the temperature of the cold water delivered to the water blending circuit is about 52° Fahrenheit year round and further wherein the supply air delivered to the zone is about at about a 48° Fahrenheit dry bulb temperature, about a 48° Fahrenheit wet bulb temperature, and about a 48° Fahrenheit dew point temperature.

25. (withdrawn) A method of graphically representing the summer and winter cycles for an apparatus for maximum work for showing the properties of supply air generated by the apparatus comprising the acts of:

a) providing a non-logarithmic ordinate for indicating a dewpoint temperature;

b) providing a non-logarithmic abscissa for indicating an outside air temperature;

c) plotting a saturation line;

d) plotting an adiabatic saturation curve, wherein the intersection of the saturation line and adiabatic saturation curve represents the wet bulb temperature, dry bulb temperature, and dew point temperature of the supply air generated in the apparatus for maximum work; and

e) using the plot of the saturation line and the adiabatic saturation curve as a tool in designing the apparatus for maximum work so that the supply air generated by the apparatus for maximum work has a desired dry bulb, wet bulb, and dew point temperature.

26. (currently amended) An apparatus for maximum work comprising:

a) an airside equipment room comprising airside equipment for providing supply air;

b) <u>roomside equipment including</u> a fan coil unit comprising a coil <u>and having a fan for blowing the supply air through the coil, an induction unit, and a radiant ceiling</u>;

c) a water blending circuit in fluid communication with

the roomside equipment ~~a fan coil unit~~ and for providing water to the coil of roomside equipment ~~the fan coil unit comprising a fan, the fan for blowing the supply air through the coil~~;

d) a refrigeration machine, a hot supply/return pipe leading to and from the refrigeration machine, a cold supply pipe leading ~~to and~~ from the refrigeration machine, and a cold return pipe leading back to the refrigeration machine; and

e) the water blending circuit comprising an upstream two position three way changeover valve connected to the hot supply runout pipe and the cold supply runout pipe, the upstream two position three way changeover valve for allowing hot water or cold water to flow through there-through, and the water blending circuit further comprising a modulating three way zone blending valve located downstream from and connected to the upstream two position three way valve, and the water blending circuit further comprising a blending pump connected to the modulating three way zone blending valve at a downstream location and for pumping water through the coil, the water blending circuit further comprising a coil return pipe extending from the coil and connected to the modulating three way zone blending valve and connected to a downstream two position three way changeover valve, the modulating three way zone blending valve for allowing all, a portion of, or none of the coil return water to be returned by the blending pump and pumped through the roomside coil, and the downstream two position three way changeover valve connected the hot supply/return pipe and the cold return pipe.

27. (currently amended) A method of conditioning air with an apparatus for maximum work comprising the acts of:

a) providing central equipment comprising a refrigeration machine, the refrigeration machine for generating hot supply water and cold supply water;

b) providing piping ~~loops~~ comprising a hot supply/return ~~pipe~~ piping loop extending to and from the refrigeration machine, a cold supply pipe extending from the refrigeration machine, and a cold return pipe returning to the refrigeration machine;

c) providing roomside equipment comprising a water blending circuit comprising a hot supply runout pipe extending from the hot supply/return pipe and a cold supply runout pipe extending from the cold supply pipe;

d) providing the water blending circuit with an upstream two position three way changeover valve comprising a first port, a second port, and a third port, wherein the hot supply runout pipe connects to first port and the cold supply runout pipe connects to the second port, the upstream two position three way changeover valve for allowing hot water or cold water to flow there-though;

e) providing a modulating three way zone blending valve connected to the third port of the upstream two position three way changeover valve at a location downstream of the upstream two position three way changeover valve;

f) providing a blending pump located at a downstream location of the modulating three way zone blending valve;

g) providing a roomside coil downstream of the blending pump and blowing supply air to a room zone through the roomside coil, the blending pump for pumping water though the roomside coil, so that return water exits the coil through a return pipe;

~~and~~

h) positioning a zone thermostat in a zone being conditioned to sense a temperature of the zone, and providing a return water thermostat to sense a temperature of the coil return water, the return water thermostat for controlling the amount of coil return water that is recirculated through the coil by controlling the amount that the modulating three way zone blending valve is open or closed to the flow of coil return water; and

i) providing a downstream two position three way changeover valve connected to the return pipe, and connecting a hot water return runout pipe and a cold water return runout pipe to the downstream two position three way changeover valve to complete the blending circuit.

28. (canceled)